

BAB VIII

PERENCANAAN BASE PLATE K2

8.1 Perhitungan Jumlah Baut Angker Kolom K2

Output Gaya Maksimum pada Sambungan hasil ETABS

$$M_u := 4364.822 \text{ kgm}$$

$$P_u := 27278.6 \text{ kg}$$

Direncanakan baut HTB $\phi 19$ BJ 41

$$f_{ub} := 4100 \text{ kg/cm}^2$$

$$\Phi_{\text{baut}} := 19 \text{ mm}$$

$$A_b := \frac{\pi}{4} \cdot 1.9^2 = 2.84 \text{ cm}^2$$

Pelat penyambung BJ 37

$$f_u := 3700 \text{ kg/cm}^2 \quad t_p := 12 \text{ mm}$$

$$f_y := 2400 \text{ kg/cm}^2$$

- Kontrol Geser

Direncanakan baut HTB 8 $\phi 19$

$$V_u := \frac{P_u}{8} = 3409.825 \text{ kg}$$

$$f_{uv} := \frac{V_u}{A_b} = 1202.64 \text{ kg/cm}^2 \quad \blacksquare \leq \blacksquare \quad 0.5 \cdot 0.75 \cdot f_{ub} \cdot 1 = 1537.5 \text{ kg/cm}^2 \quad \text{OK!!}$$

- Beban Tarik (interaksi geser dan tarik)

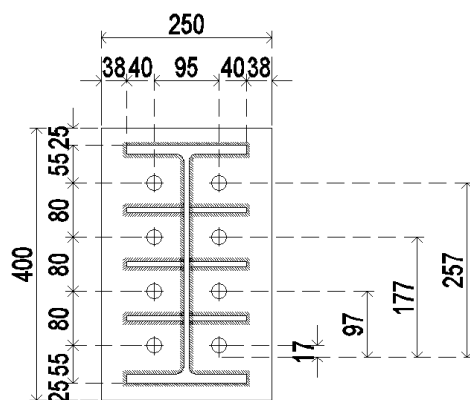
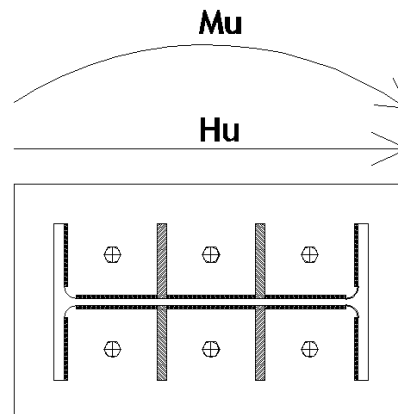
$$f_t := (1.3 \cdot f_{ub} - 1.2 \cdot f_{uv}) = 3886.834 \text{ kg/cm}^2 \quad \blacksquare \geq \blacksquare \quad f_{ub} = 4100 \text{ kg/cm}^2$$

$$f_t := f_{ub} = 4100 \text{ kg/cm}^2$$

$$T_d := 0.75 \cdot f_{ub} \cdot A_b = 8718.509 \text{ kg}$$

Mencari garis netral ----> anggap dibawah baut terbawah

$$a := \frac{8 \cdot T_d}{17.5 \cdot 2400} = 1.66 \text{ cm} \quad \blacksquare \leq \blacksquare \quad 5.5 \text{ cm} \quad \text{OK!!}$$



Momen rencana yang dapat dipikul sambungan

$$\Phi M_n := \frac{\left[\left(0.9 \cdot 2400 \cdot a^2 \cdot \frac{17.5}{2} \right) + 2 \cdot T_d \cdot (1.7 + 9.7 + 17.7 + 25.7) \right]}{100} = 10076.71 \text{ kgm}$$

$$\Phi M_n = 10076.71 \text{ kgm} \quad \blacksquare \geq \blacksquare \quad M_u = 4364.82 \text{ kgm}$$

8.2 Panjang Angker

$$T_u := \frac{M_u}{2 \cdot (0.017 + 0.097 + 0.177 + 0.257)} = 3982 \text{ kg}$$

$$\sigma_b := 250 \text{ kg/cm}^2 \quad (\text{Tegangan beton})$$

$$L_d := \frac{T_u}{0.9 \pi \cdot 1.9 \cdot \sqrt{\sigma_b}} = 46.886 \text{ cm} \quad \blacksquare < \blacksquare \quad L_{\min} := 30 \cdot \Phi_{\text{baut}} \cdot 0.1 = 57 \text{ cm}$$

Pakai panjang angker 60 cm

8.3 Sambungan Pelat dengan Solid Beam (Sambungan Las)

Digunakan las F_{E70XX}

Tebal las $t_e := 1 \text{ cm}$

Profil WF 350 x 175 x 7 x 11 BJ 37

$$h := 350 - 2 \cdot (11 + 14) = 300 \text{ mm}$$

$$A := 2 \cdot (30 + 17.5) \cdot 1 = 95 \text{ cm}^2$$

$$I_p := 2 \cdot \left[\left(\frac{1}{12} \cdot 30 \right)^3 + \left[1 \cdot 95 \cdot \left(\frac{35}{2} \right)^2 \right] \right] = 58218.75 \text{ cm}^4$$

Akibat beban geser sentris

$$P_u = 27278.6 \text{ kg}$$

$$f_u := \frac{P_u}{A} = 287.14 \text{ kg/cm}^2$$

Akibat beban momen lentur

$$M_u = 4364.82 \text{ kgm}$$

$$S_x := \frac{I_p}{17.5} = 3326.79 \text{ cm}^3$$

$$f_h := \frac{M_u \cdot 100}{S_x} = 131.2 \frac{\text{kg}}{\text{cm}^2}$$

$$f_{\text{tot}} := \sqrt{f_u^2 + f_h^2} = 315.7 \frac{\text{kg}}{\text{cm}^2}$$

Kekuatan rencana las

$$\Phi f_n := (0.75 \cdot 0.6 \cdot 70 \cdot 70.3) = 2214.45 \frac{\text{kg}}{\text{cm}^2}$$

$$f_{total} < \Phi f_n$$

$$t_{perlu} \geq \frac{f_{tot}}{\Phi f_n} = 0.143 \text{ cm}$$

$$a_{perlu} \geq \frac{0.143}{0.707} = 0.202 \text{ cm}$$

Syarat :

$$a_{min} := 5 \text{ mm } (t = 12 \text{ mm})$$

$$a_{effmax} := 0.707 \cdot \frac{3700 \cdot 0.8}{70 \cdot 70.3} = 0.42 \text{ cm } (\text{las di badan})$$

$$a_{effmax} := 1.41 \cdot \frac{3700 \cdot 1.3}{70 \cdot 70.3} = 1.38 \text{ cm } (\text{las di daun})$$

maka dipakai $a = 5 \text{ mm} > a_{perlu} = 2.02 \text{ mm}$

- **Kontrol Pelat Sambung**

Pelat penyambung BJ 37

Direncanakan baut BJ 37

$$f_u := 3700 \text{ kg/cm}^2$$

$$f_{ub} := 3700 \text{ kg/cm}^2$$

$$f_y := 2400 \text{ kg/cm}^2$$

$$d_b := 1.9 \text{ cm}$$

$$t_p := 1.2 \text{ cm}$$

$$A_b := \frac{\pi}{4} \cdot 1.9^2 = 2.84 \text{ cm}^2$$

Luas bidang geser

$$L := 35 \text{ cm}$$

$$A_{nv} := (L - 4 \cdot d_b) \cdot t_p = 32.88 \text{ cm}^2$$

Kuat Rencana

$$\Phi P_n := 0.75 \cdot (0.6 \cdot f_u \cdot A_{nv}) = 54745.2 \text{ kg} \quad \blacksquare > \blacksquare \quad P_u = 27278.6 \text{ kg}$$